THE MOTOR AGE

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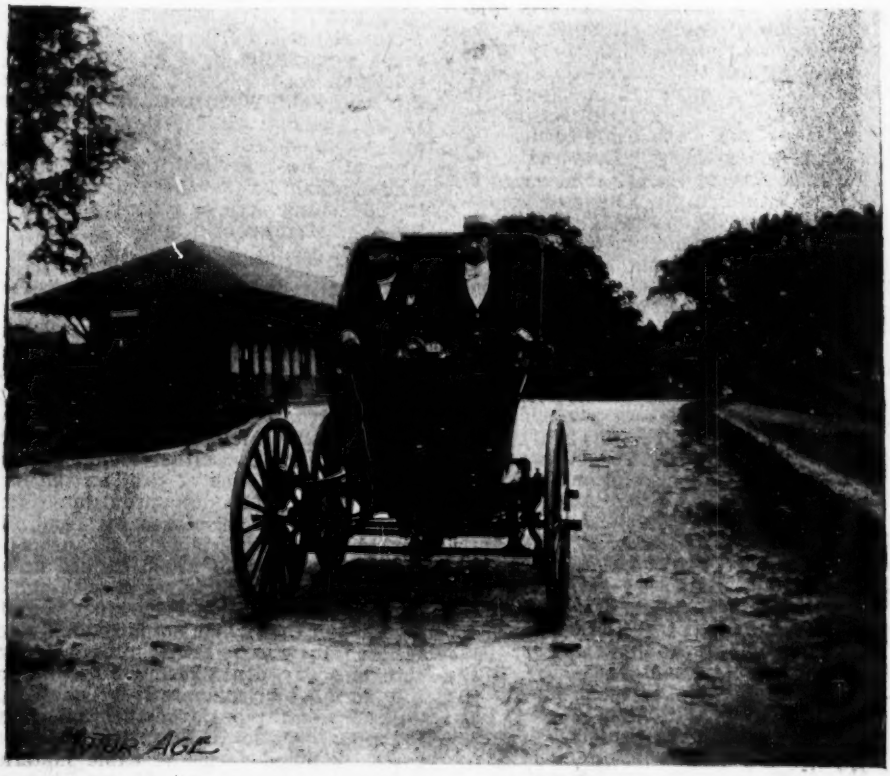
A DESCRIPTION AND ITS MORAL

MECHANICAL DESCRIPTION OF COMPLETE MOTOR VEHICLES AND THEIR PROPER PLACE AND CHARACTER IN THE MOTOR AGE—OF VALUE ONLY WHEN PRECEDED BY WELL AUTHENTICATED TESTS.



The Heymann Automobile Company's New Phaeton.

The accompanying cut represents the motor vehicle of the Heymann Motor Vehicle & Mfg. Co. of Melrose, Mass., of whose promising work brief mention was made in The Motor Age of September 12. Since the writer's visit to the Heymann company's works its vehicle has been completed and put on the road.

The following description is furnished by the makers:

The body is of the well known Stanhope phaeton style. It is mounted on a double truss tube frame, which supports the motor. Archibald wooden wheels 36 inch in diameter, with solid rubber tires, are used. The motor is a vertical 3-cylinder engine of 6 H. P., Otto cycle, the speed of which is regulated by changing the point of ignition, covering all speeds from 160 to 1,500 shaft revolutions per minute. All speeds up to 20 miles per hour are obtainable by means of a sprocket and chain transmitter gear, whose construction is such that varying speeds may be obtained, regardless of the speed of the engine. This gear is contained in a case of 12 inches diameter and 4 inches thick, on rear axle. The details of construction are withheld at present. Weight of carriage, 850 lbs. The gasoline tank holds enough for a 150-mile run.

While The Motor Age has reason to believe that the Heymann vehicle has merits in the way of reliability and smooth running, even at low speeds, the reader will notice that the above description fails to reveal exactly that part of the construction by which it differs materially from other gasolene motor vehicles The description is given here only to illustrate why The Motor Age—as explained in the September 12 number—will ordinarily decline to print in its reading columns any kind of mechanical description of motor vehicles unless the same may disclose the entire set of mechanical principles by which the vehicle as a complete organism is operated. Ordinarily the consent of the maker to absolutely complete publicity cannot be obtained at the present stage of the industry and nothing less than complete explanation of the entire structure is of real value to the public as the parts omitted are always those of the greatest importance, being always those that are not common property of the engineering world, and always those on which the particular concern in question bases its hopes of success. A partial description is a "delusion and a snare," unless it is accompanied by perfectly reliable data proving that the vehicle to which it appertains has been subjected to thorough and practical tests and that the mechanism by such tests has been found satisfactory in its entirety. In that case the partial description furnishes the information that the mechanical elements specified in it are not contrary to the requirements of good construction, although they require to be supplemented by those mechanical elements of which description is withheld. In this there is valuable information for the public, but it is readily seen that the value of it depends entirely upon the reliability of the practical tests and that therefore the tests must precede such partial description.

In all or nearly all motor vehicle publications the order of presentation has been reversed. Space has been wasted for descriptions of vehicles of whose actual merits in practical use the publishers and editors knew next to nothing. The public has been bombarded with mechanical suggestions which the next week had to be discarded because practical experience speedily proved them of no value and indeed misleading.

The Motor Age, as before stated, will take the course of looking first for the practical tests and, only when those prove of public interest, furnishing descriptions of construction details. By so doing The Motor Age will greatly economize time and mental effort for its readers. Less dead and valueless matter will accumulate in its back numbers. It will be a record of real progress in motor vehicle construction and not a graveyard filled with pictorial tombstones of all the motor vehicles which sprung up today and were buried on the morrow. Great efforts will be put forth, on the other hand, to secure complete descriptions of tests and of every-day work with those motor vehicles which, at any given time, reach a reasonably high standard of efficiency for the work for which they are intended. When nothing to the contrary is said, such descriptions of tests and work as will appear in The Motor Age will be furnished by eyewitnesses whose reliability has been demonstrated to The Motor Age or whose position in the engineering world is recognized.

Contributions are Welcome.

For such descriptions of actual running qualities and efficiency space will be allowed in The Motor Age without stint, and users of motor vehicles are invited to contribute out of their own personal experience so as to throw light upon the advantages that they may derive from motor vehicles as well as the troubles that arise either from faults in construction or lack of skill on the part of operators. The only provision which The Motor Age desires to emphasize in regard to contributions from users is that all events that are described at all are described completely and with avoidance of generalities. They must contain a record of that which actually took place in each instance. Praise or condemnation and any other form of surmise or inference are of comparatively small value, representing only the theories of one individual, while observation of facts carefully noted forms valuable material that each reader of The Motor Age may couple with facts of his own observation so as to render his judgment on motor vehicle matters proof against the claptrap arguments that unrestricted competition in the motor vehicle industry is bound to bring forth.

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THE DE DIETRICH SPEED GOVERNOR

DEVICE FOR MODIFYING THE POWER OF EXPLOSIONS WHEN LESS POWER IS REQUIRED FOR RUNNING THAN THAT NATURALLY PRODUCED BY THE MOTOR AT ITS ENGINE SPEED.

Among the gasoline carriages in France, those made by La Societe de Dietrich et Cie, whose parent plant is the de Dietrich iron works at Niederbronn, Alsace, Germany, are commonly considered the most elegant in general appearance. In their construction is incorporated one feature which is of special interest for the American industry as its merit is mainly noticed at the low speeds which American roads make compulsory. Its general effect is to reduce the power of the motor when small power is required and thereby diminish the vibration of

Fig. 1.

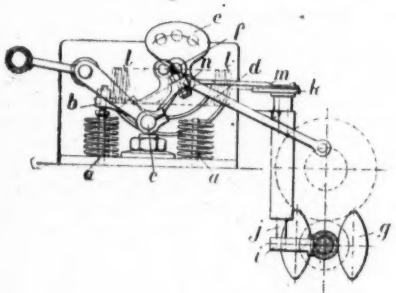
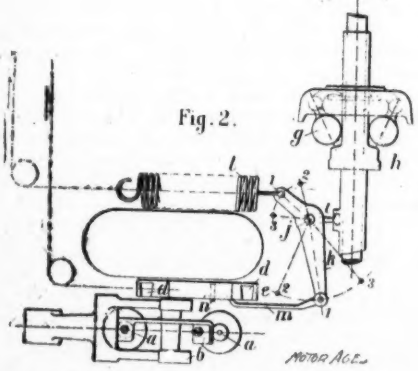


Fig. 2.



the vehicle while not interfering with the adjustments of carburettor or ignition.

Description of the Device.

It is in the nature of a governor, which by means of a special combination of parts, acts upon the exhaust valves altering their travel, so that they open more or less in such a manner as to retain a certain quantity of the burnt gas, and consequently to reduce the admission at the stroke following which will cause the engine to do less work.

In the accompanying drawings Fig. 1 is an elevation of the governor and Fig. 2 a plan of the same.

It is composed of the parts hereinafter described: a are the valves actuated by a tumbler b which is worked by the distributing mechanism of the engine; c is the axis of the tumbler which is mounted in a block which slides in a groove d formed in a cam e.

The function of this cam is to raise the axis of the tumbler or lower it according as the engine does more or less work. The tumbler on being raised or lowered presses more or less upon the valve spindles and alters their travel, for this cam turns about a pivot f located slightly to the right of the center of the cam groove d and the arrangements are such that when the sector is in its extreme position on the right, the centre of the groove is at its lowest position; the axis of the tumbler is then in its lowest position and the engine is working at its maximum.

If the engine is working too quickly the ball governor g pushes the cam to the left and causes the tumbler axis to be raised.

The Changes are Continuous.

The variations in the travel of the valves are continuous by reason of the sector or cam being curved and the valves can pass from their maximum opening to zero, that is to say, to stopping the engine.

The governor g, when the speed increases, causes the sleeve h to be lowered and to press upon the lever i fixed upon a spindle j which carries at its other end a two armed lever k, one arm of which is attached to the spring l, and the other joined to a small connecting rod m pivoted to the sector e at n. The spring l has for its object to limit the action of the governor and allow a power varying from zero to the maximum to be assigned to the engine by means of its greater or less tension.

If the spring l be fully stretched the lever j will be brought into the position 2—2 (the position 1—1 of the lever being considered as the mean position). Consequently the cam e is displaced by the connecting rod m towards the right in such a manner that the block carrying the axis c of the tumbler turns into its lowest position corresponding to the maximum travel of the valves, that is to say, to a maximum power of the engine.

If the spring l be completely relaxed the lever k will come into the extreme

position 3—3 and the axis of the tumbler will correspond to the minimum travel of the valves and each phase of tension of the spring 1 will correspond to a given power of the engine. Maximum tension corresponds to the greatest power and no tension to zero.

Advance Regulation Possible.

The governor can only act when it has overcome the tension of the spring, so that the power of the engine can be regulated in advance by regulating the spring by hand and the governor has for object only to govern the speed of the engine, as soon as the resistance to be overcome is less than that which corresponds to the tension of the spring.

The tension of the spring may be adjusted as desired either by a hand lever or by a pedal.

The British rights for this device have been secured by R. B. Ransford, Upper Norwood, Surrey county, England.

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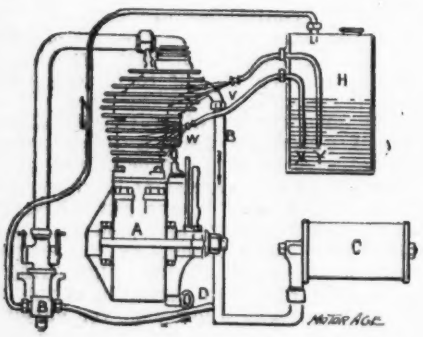
A TRIED COOLING DEVICE

The Bourguignonne Automobile Company at Dijon, France, has recently come into prominence by its demonstrated success in construction. Two of its "voiturettes," in which the improvement described below was incorporated, traveled 434 miles in a mountainous country in two days without mishaps and the Automobile Club of France honored these vehicles at the recent exposition with the first prize for comfort and elegance.

The company uses for its smallest vehicle the Gaillardet 3-horse-power motor, which is in a fair way to be considered the most reliable small motor produced



in France to-day, and the Sphinx 5-horse-power, two-cylinder motor for larger vehicles. But it has improved upon the efficiency of these motors by the system of water cooling which is illustrated in the accompanying drawing.

By this system the cylinders are maintained at a constant temperature by sprinkling with atomized water, and it is learned from reliable source that the atomizer consumes only about two quarts of water for nearly 200 miles of travel. The weight due to large water supply required with the ordinary cooling jacket is therefore much reduced, and the usual water-circulation pump and radiator are also dispensed with.

The functions of the system are as follows: The exhaust gases pass from the cylinder through the pipe B to the exhaust tank C. From the pipe B a secondary pipe D branches off, through which the gases, after heating the carburettor E, reach the upper three-way valve G, which permits, at the driver's option, to let the gases escape into the atmosphere or to lead them into the atomizer tank H. In the latter case a pressure is produced above the water in this tank and the water is consequently forced out through the small orifices V and W in the tubes X and Y and reaches the cylinders in atomized form. The orifices are about 3½ inches from the cylinder, which is provided with radiator ribs. At the inner ends of tubes X and Y two little filters prevent the entrance of foreign particles which might clog the spray.

RAILWAY INSPECTION MOTOR CARS

Inspection hand cars used on railways will probably be very generally discarded in favor of cars provided with gasolene motors. The Illinois Central Railway Company has been experimenting with a motor inspection car weighing 300 pounds which with three passengers has run 75 miles in two hours consuming one gallon of gasolene. The Santa Fe, the Burlington & Missouri River, the Canadian Pacific and the Chicago & Northwestern railway companies are all contemplating the adoption of motor cars of the same or similar pattern.

British rights to the Whitney steam carriage have been secured by Brown Bros., Great Eastern street, London, E. C.

FROM NEW ENGLAND AND NEW YORK

THE BAKER SPEED AND REVERSING GEAR.—SYSTEMATIC EFFORTS AT COLUMBIA WORKS.—ROPER'S WORK RESUMED.—OVERMAN'S AUTOMATIC CARRIAGE.—THE EISENHUTH SYSTEM.

The observations on manufacture and experimenting in New England which were commenced in the first number of The Motor Age left the reader with H. C. Baker of Hartford, Conn., and his remarkable three-cylinder gasolene motor. It may be added in regard to the work of Mr. Baker that it seems equally painstaking and skillful in the matter of transmission gearing, but when his shop was visited he had not yet reached his final results on that point. His engine shaft runs lengthwise through the center plane of the vehicle and is divided toward the rear by a nest of bevel pinions operating like a compensating gear (balance-gear, as it is called in England, or turn-gear, as we should prefer to call it). By this means he obtains various speeds, being enabled to revolve the rear portion of the shaft slower than the front end, which is positively connected with the motor, and even reversing it. He has accomplished this by a conical drum, on the front end of the shaft, actuating a friction disk which is adjustable upon a shaft mounted at an angle with the motor shaft corresponding to the angle of the conical drum. This oblique shaft carries a bevel pinion near its rear end meshing with a bevel pinion on the rear extension of the motor shaft, retarding this portion more or less according to the adjustment of the friction disk. The arrangement makes a very compact and simple drive but Mr. Baker finds the friction drive insufficient for hard work, being his own most severe critic. His first satisfactory vehicle is contracted for by English parties and will be shipped across the ocean.

Columbia Company's Safe Plan.

Hartford is the home of several other ardent and hard workers in the motor vehicle field, first among which in the way of magnitude and visible results ranks the Columbia Electric and Vehicle Company under the engineering superintendence of Mr. Eames. Multitudes of workmen with plenty of modern machinery at command are vainly striving in the large Columbia works to keep pace with orders for electric carriages though reenforced by the New Haven carriage works and other plants adapted for the manufacture of carriage bodies. Experimental work with tires for these vehicles is carried on on the extensive scale for which the Pope companies have always been noted, and which is made doubly necessary in this case by the urgency of reaching results in regard to tires which shall make that feature of electric vehicle construction equal to the batteries, motors and carriage work in reliability. The Columbia company has just finished two patterns of gasolene vehicles which it is intended to place on the market. The writer had no opportunity to see them—time being limited—but was informed that they embody the best features of European construction, having been designed after prolonged investigation of all European models, with a view to excluding everything that might be considered experimental and untried. Mr. Eames does not consider them perfect, as the last word in gasolene motor vehicle design has not yet been heard anywhere, but trials he says have demonstrated them to be fully equal to the best in gasolene motor vehicles manufactured anywhere on earth.

And this must, of course, be the starting point for any large manufacturing concern. If it must manufacture—and not only build experimentally for its own satisfaction—its production must follow the data that have been fully established as giving certain results, even while admitting that better things may follow or may be already in the market in untried or undeveloped condition. In the experimental department of the Columbia works experiments with new features in gasolene motor vehicles are being vigorously pushed.

Other Hartford Workers.

A wagon operated with compressed air has been built in Hartford upon designs of inventor Kendell, who is connected with the firm of E. S. Kibbey & Co., but nothing could be learned about the results of the venture.

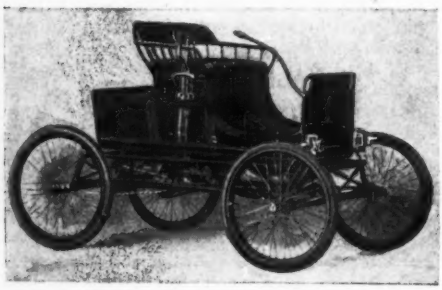
C. E. Spencer, a friend and associate of the deceased Roper, to whose experiments with steam bicycles the whole New England development of the light steam wagon owes its first impulse, has recently reentered the arena and shortly before September 1 was well advanced with a steam wagon of his own design.

The Premier Mfg. Company of Hartford, which is the eastern depository for C. J. Smith & Sons Company of Milwaukee, is enjoying a very lively trade in

carriage parts, receiving numerous orders from motor vehicle builders for suspension wheels with steel rims, hubs and frame parts and fittings.

Overman's Ambitious Beginning.

At Chicopee Falls A. H. Overman is developing a great deal of activity in perfecting a steam wagon designed by Mr. Bullard, whose inventions pertaining to bicycles and back-pedaling brakes are well known. Mr. Overman has also given his attention to gasolene motor wagons, having finished several which seem to



The Overman Steam Wagon.

operate satisfactorily—the only trial witnessed took place on the smooth floor of the fourth story of the factory—but his enthusiasm is reserved for the steam wagon. Fifty of them were being built at the time of the visit and their crowning feature will be the thoroughly automatic regulation not only of the fuel feed —which presents a comparatively simple problem—but also of the water feed, for which every inventor in this field is striving but which nobody has yet attained. Whether Messrs. Bullard and Overman have fully accomplished this much desired automatic regulator, which will largely determine whether steam wagons may be placed in the hands of all classes of people with permanent satisfaction to both seller and buyer, remains, for aught that was demonstrated to the writer, still problematic, but Mr. Overman expresses so much faith in his device as to offer to sell these wagons under "guarantee to be satisfactory in road work before payment."

A very interesting commercial fact in this connection is Mr. Overman's intention to sell his wagons through agencies from the beginning and fortify his agencies with power to extend the above mentioned guarantee to their customers.

The exhaust steam in the Overman wagon is carried through the tubes of the frame to an exit near the ground. In the wagon seen in operation indoors the exhaust steam continued to be distinctly visible, though not noisy, but that was explained as being due to a misadjustment of the fuel feed regulation, and the following morning Mr. Overman was seen threading his way through the streets of Hartford with another wagon, the exhaust from which was hardly noticeable at the time of observation. In regard to the mechanical expedients adopted in the steam wagon as well as in the gasolene motor vehicles Mr. Overman desires that as little as possible should be published at present, in this respect following the general inclination to keep imitators at bay and the road to further improvements unimpeded by premature declarations.

The public will, of course, understand that under these circumstances their contributions to the progress of the industry, in form of purchases, will not be considered stinted if they are equally discreet for the time being.

Small Danger of Bad Work.

Reverting to Mr. Overman's concern it is worth noting that on the subject of prices Mr. Overman declares himself as belonging to the bearish group that believe in turning out motor vehicles at low prices from the beginning so as not to encourage competition from those who would at once commence to lower prices by economizing in the quality of material.

It seems to be a widespread notion that something similar to the demoralization that caused havoc in the bicycle industry from this cause, is likely to be repeated in the motor vehicle industry, but the writer ventures the prediction that noth-

Eisenhuth's Gasolene and Air Carriage.

ing of the kind will occur because the motor vehicle trade will deal with an entirely different class of people and one which will demand strong guarantees of efficiency and durability before it invests its money. Furthermore the stakes in the motor vehicle industry are high and will not be lightly jeopardized and efficiency in a motor vehicle may be much more positively demonstrated than the efficiency of a bicycle. Public safety is

also a factor which will play a more important part and is likely to be jealously guarded by administrative measures if manufacturers fail to guard it themselves. In foreign countries the trend in industrial developments has been toward a continual improvement in the quality of material, and the same development may be looked for here.

In Springfield, Mass., J. Frank Duryea represents the most promising phase of motor vehicle work, being the engineer of the American Automobile Company, which has offices at 20 Broad street, New York city. He has several styles of gasolene motor vehicles ready for manufacture, but the arrangements for factory and financial organization are as yet unfinished and no results of interest to prospective purchasers may be looked for this year.

Eisenhuth's Combination Motors.

Amid all the various patterns of vehicles that may be seen in the eastern states none bears the earmarks of original research and long continued work to a higher degree than the Eisenhuth carriage shown in the accompanying reproduction from a photograph. Since 1885 J. W. Eisenhuth of 40 Wall street, New York city, has been giving all the time which he could spare from his ordinary business as a private banker, to investigations in chemistry and mechanics and he has secured a long series of domestic and foreign patents covering his method for operating vehicles with a combined gasolene and compressed air motor, in which the air is compressed by the gasolene motor and in turn serves to equalize the power from the latter so as to make the driving effect softer and more flexible. Mr. Eisenhuth says that he has operated his vehicle to his own entire satisfaction over several thousand miles of sandy and hilly roads in New York and other states, and that he will have a large factory in running order inside of a few months.

In the next number of The Motor Age a further description of the Eisenhuth mechanism in one of its forms—for there are several—will be found in the department devoted to theory, where the Eisenhuth belongs at present, so long as the tests showing its practicability have not been publicly verified. Mr. Eisenhuth has declined several offers to purchase his inventions.

THE OWNER'S DAILY EXPENSE

ACCOUNT OF EXPENSES INCURRED BY USE OF GASOLENE MOTOR VEHICLE BY FRENCH PHYSICIAN DURING TWENTY-TWO MONTHS.—REPAIRS A LARGER ITEM THAN WOULD BE TOLERATED IN UNITED STATES.

If there were in United States a large class of people enjoying large incomes without having their time occupied, the motor vehicle industry would probably have plunged into mass-production of imperfect vehicles as rapidly and as recklessly as did France, in spite of our bad roads. But there are very few Americans who have nothing better to do than to graduate as chauffeurs and glorify themselves as motor vehicle sportsmen. The average well-to-do American has neither time nor inclination to make driving of a fitful machine his principal occupation in life. He is perhaps also prejudiced against the none too clean and often irksome work of keeping a motor vehicle in good condition and does not appreciate the mental effort of studying its shortcomings and devising and executing repairs. Unless it is his business or he can otherwise see money in it, he will prefer to leave all the trouble to the builder and constructor, and he will not consent to be troubled largely with repairs anyway, if they must either engage much of his personal attention or cost too much, or both.

To the venturesome, idle college-taught heir to an income in France all these troubles and expenses, mechanical tinkerings and acquirement of driving skill constitute a sport entirely of its own and highly satisfactory because it enables its devotees to make an exhibition of money, mental ability and physical daring, all at the same time. A sport, too, which has the public streets and roads for a play ground. In some respects the imperfect, experimental vehicle was a better instrument for this kind of sport—it produced more sensations and reflected more glory for skill—than the perfect motor vehicle can ever be after it shall have been made a thoroughly obedient and reliable servant of man. No wonder, therefore, that the industry in France could prosper, drawing a liberal support, as it did, from a class of people who preferred an "interesting" experimental vehicle to a practical and reliable one. French makers found it profitable to ac-

tually manufacture experimental carriages, and of course gained experience rapidly by thus being permitted to experiment gratis on a large scale. It is not till very lately, however, that they have arrived at the degree of reliability in construction and acceptability in design that in this country would be considered indispensable by clear-headed business men for commencing manufacture at all.

A Parallel at Home.

The only parallel that this country presents is the use of electric carriages at Newport by the wives of rich men. The women are the only rich idlers that are found in colonies in this country. And the parallel is not perfect because electric carriages require no mechanical insight by the drivers. They are less troublesome, within their narrow field of work and weights, than either gasolene motor or steam carriages, but when they are out of order the driver can seldom mend them; they must go to the factory.

There are a few intending manufacturers here who undoubtedly believe that they can duplicate the French trick of making the population accept experimental carriages as commercial goods, but the majority know better. They understand that motor vehicles must be reliable before they may be marketed with permanent success in United States, and they do not start in where the French were three years ago, but where the French are now with their very best types, and in some cases, it is confidently believed, several degrees ahead of them.

An interesting illustration of the shortcomings of French gasolene motor vehicle is furnished by a physician, Dr. Colbert, in France, who tells of the expense incurred by him by six months' use of a carriage of this type. He writes in a very matter of fact style and, in substance, as follows:

The Physician's Account.

My mileage has been about 4,278 miles, of which 3,100 miles on professional visits. In April I traveled in one day 94 miles and from October 27 to November 21, 17 days. I made a pleasure trip covering 1,081 miles, without any other mishaps than three tire punctures caused by nails.

The total expenditures have been as follows:

Gasolene, 278 gallons	$ 87.41
Lubricating oil, 17½ gallons	5.44
Axle grease, 2½ quarts	.71
Repairs: Carriage work	102.57
Motor mechanism	184.91
Pneumatic tires	27.54
Sundry	64.80
Depreciation and interest	153.78
Stabling and taxes	50.
Attendant	200.
Total	$877.16

The repairs of carriage work from April 1 to 23 comprised: painting, changes in the leather top, new rubber for the carriage step.

The repairs of motor mechanism numbered three. Between March 19 and April 1 various pieces in the transmission gear were altered or replaced, especially in the compensating gear and the speed-change. Two worn chain links were replaced. The motor was not touched. These things amounted to $53.68. Between October 4 and 27, before departure on my pleasure trip to the south of France, the motor and the gearing were overhauled. One of the speed-change pinions had to be replaced on account of excessive wear. The overhauling cost $108.94. Between December 13 and 15 the carriage was laid up for cleaning and readjustment of the counter shaft and various minor adjustments; cost $11.09. Hereto must be added two platinum tubes, two chains, bolts and nut springs, etc.

The tire account shows six repairs of tire casings, two for the front wheels and four for the rear. Since I have had my carriage I have traveled altogether about 7,500 miles and I have not yet bought a new tire casing. But now the old ones cannot last much longer.

The Sundry account includes purchase and attachment of a searchlight carriage lamp and a hand lubricator, about $30, and various other accessories.

Adding these figures to those which I had booked last year I find a total expense of $1,379 for about 7,500 miles of travel during 22 months, which gives a daily expense of $2.05, and an expense per mile of about $0.18.

Convenience Overshadows Economy.

The doctor adds to the above some remarks and figures intended to show that the daily cost is approximately a fixed quantity for anybody traveling under conditions similar to his own, but that the cost per mile naturally decreases if the carriage is worked harder and increases when it is used less, the fixed expenses, such as interest and depreciation, attendance and stabling, being about the same.

He arrives at the general conclusion that a well-made gasolene motor vehicle is a reliable instrument for traveling and possibly averages cheaper than horses and carriage, but he complains of fantastic repair prices and high first cost and expresses the opinion that these conditions must be changed before its economical advantages, which are largely in the form of time-saving, can become generally recognized.

The carriage which he used had a motor of 4-H. P. (not stated whether brake or indicated), and weighed 1,632 pounds. It always carried two persons weighing 360 pounds and a trunk with accessories weighing about 170 pounds. The average speed during the above mentioned pleasure trip of 1,081 miles was 12 1-6 miles per hour.

America's Prospective Showing.

It is not to be doubted that American gasolene motor vehicles must make a better economical showing than the above before the public at large will abandon

the horse, and the industry is well aware of this necessity though naturally willing to take advantage of the liberality or inexperience of those purchasers who still believe that the sole cost of a motor vehicle is the celebrated 1-3 cent per mile which comes more or less near paying for the fuel.

COMPRESSED-AIR STREET CARS

The air-power cars on Twenty-eighth and Twenty-ninth streets are an experiment. The description in yesterday's Journal of the results of their operation will convince the public that the experiment is not one to be extended. The people who ride on the cars or live along their route have no need to read any description.

The air motors are insufferably noisy—they are practically steam locomotives, under fifteen or twenty times a locomotive's pressure. They leave continuous trails of mixed grease, graphite and moisture from their exhaust cylinders, to the ruin of any fabric that touches them. They are dangerous, for an explosion of a cylinder under a pressure of 2,500 pounds to the square inch would resemble the work of a torpedo.

The Metropolitan Company's experiment has been interesting, but it has gone far enough. Let us have something milder next time, please.—New York Journal.

THE LALLEMENT STEEL CUSHIONS

In the Lallement spring cushions for vehicle seats, which are in extensive use in France, in place of stuffing or padding of any kind, tempered steel blades are arranged across the seat. These blades curve round at each end, and are hinged upon two suitable steel rods. At the joints where they hinge they are copper lined to prevent any squeaking. The springs are enameled to prevent rusting, and covered in by a neat box casing, and the cushion is fitted on the top in the usual way. They are said to be very comfortable and durable.

THE ILLINOIS COMPANY'S PURCHASE

The Illinois Electric Vehicle & Transportation Company has bought a $200,000 property on Michigan avenue, Chicago, for $50,000 in cash. It will be used for office, livery and electric stable purposes. The directors of the Illinois company are: John J. Mitchell, C. K. G. Billings, Levy Mayor, C. F. Kimball, Martin Moloney, James S. Hayes, R. T. Lincoln, E. L. Brewster, Harry Payne Whitney, Samuel Insull, P. A. B. Widener. Samuel Insull is president and C. F. Kimball vice-president.

The Massachusetts Motor Vehicle Company of Lynn, Mass., John C. Welch, manager, has completed a vehicle provided with motor made by St. Louis Gas Motor Company. It is said to run well. Twenty different styles of automobiles are reported to be completed or in process of construction in and around Lynn.

The Huntington Mfg. Company of Huntington, Ind., has added a new department to its factory where special parts, taps, dies, tools and patterns for makers of motor vehicles will be turned out.

SENSATIONS OF MOTOR TRAVEL

THE FIRST SENSATIONS OF TRAVELING BY GASOLENE MOTOR VEHICLE THROUGH THE STREETS OF LONDON AND IN THE ADJACENT COUNTRY PICTURESQUELY DESCRIBED BY G. W. STEEVENS.

On the clean cobble-stone of the mews they were simultaneously putting a pair into a victoria and starting the engine of the motor car. The motor thudded and rattled and shook, but the horses took no more notice of it than if it had been a four-wheeled cab. Living with it, they regard it with perfect equanimity. The very coachman—rotund, rosy, straight-backed—when first it came inspected it briefly, then reflected awhile, and delivered his qualified blessing. "It does look complicated," he said—"but you can see into it. The inside of a horse is more complicated, and you can't see into that."

I had never yielded to the superstition that motor cars meditated the extinction of the horse any more than railway engines or electric tramcars or bicycles did. But I was far from enamored of the new toy. Another Frenchified bauble, I said, and how characteristic of idle, extravagant, unstable London to go mad about it. And when we started off I liked it none the better. Vibration was not the word for it; it quivered and jumped as if it must fall to pieces. Its noise was just preferable to that of a shunting train at two in the morning of a hot and sleepless night. It stunk vilely. I was assured that this was not the petrol fumes, which drive the thing, but only the lubricating oil; I agreed meekly, but it still stunk.

The Narrow Escapes.

When we emerged into the crowded Mayfair morning, the thing seemed equally impossible. The car thudded less as it suddenly put on pace and shot into the open gap between a brougham in front of us and a van meeting us. Was the man mad? Ah! With a foot to spare on each side we slip between. But now we were spinning along at a hand-gallop—and just ahead is a block across South Audley street. We bound toward it. Again I look with wondering deprecation at the tanned, green-liveried French boy who drives us. His hand leaves the steering wheel, but we are two yards from the tangled mobs of hansoms and phaetons and carts and horsemen. His hand slips to his side—crash. It came gently enough, too—then I realize we have not run into anything, but only pulled up dead a foot away.

It was plain that the driver knew his business; but at the same time I reflected that in a full London street a motor car takes a lot of driving. But on further reflection that only seems so at the beginning. You have more variations of speed at command than in driving a horse; but, once accustomed to that, the motor-car needs no more judgment when to slip through and when to pull up than a hansom cab does, and it is very much easier to steer and to stop. Any cab driver who knows how to drive will tell you that there are far more accidents with slow horses than with fast ones, because once a slow horse gets into a tight place he has not the pace to nip out of it. At this rate a machine-driven carriage, being able in an emergency to put on fifteen miles an hour at a second's notice, is, with a good driver, the safest of all. Add that it can pivot on its own length and averages about a third shorter than a vehicle with a horse in front—and you will see that it is only because London is London that it has been able to do without it so long.

Business First, Pleasures Afterwards.

True that to drive a machine can never be so interesting as to drive a living thing with likes and fears, moments of generosity and moments of sulk, to be encouraged, coaxed, economized, mastered. I had rather, for pleasure, sit on the front seat of an omnibus and watch a good whip handle a young horse than bowl along in the softest electric brougham in the world. But then—then I awoke and looked at the packed streets and the van drivers who cannot drive—and, after all, in a place like London, business should come first and pleasure afterward.

Greatest Comfort at Brisk Gait.

In the meantime we were threading through the packed streets and coming out into the opener north. Presently the houses began to thin; we had passed Finchley Road station—and next thing I noticed we were flying down a tree-bordered hill as if on a toboggan. By instinct I sat back—with as much reason as who should ease his weight off the shoul-

ders of the Flying Scotsman; the displacement of ten stone could hardly help or handicap a machine that weighs a ton and a half. The heavy carriage ran as easy and as steady at twenty miles an hour as it did at ten—and a great deal easier than it did at none at all. At rest, the engine throbs like an earthquake, for it must be doing something. At a high speed it is putting all it knows into driving the carriage, and has no energy left for anything but a slight vibration. In an hour you notice this no longer; also the smell is either gone or has acclimatized you to itself. The noise has eased from a thud and a rattle to a whir. Nothing remains disagreeable except the hoarse bark of the horn; that is a necessary evil, for if it did not make a distinctively unearthly noise nobody would take any notice of it.

Power Insufficient for the Weight

The pull on the opposite rise was not so successful. The impetus of the descent once exhausted, we begin to throb and crawl again. Evidently this was the weak point of the machine. It slowed to four miles an hour; any decent horse could have passed us contemptuously. But this was a heavy carriage with four people in it. And after all, when we pulled up beside the great main road to lunch on the grass we had got into a steady average of some dozen miles an hour. Sandwiches and bottles came out of secret places in the car; and if you would, there were brushes and a looking-glass to adorn yourself withal after them.

Panic of Onlookers.

Then on again—panting up a rise, swished under the break down into a valley, barking through a hamlet, slowing to pass a shying horse. It was surprising how soon you came to take this unaccustomed machine for granted, and turned to noticing what other people seemed to think of it. Knowing that it could be brought up dead in a second, it was amusing to see people salute it with panic, to see mothers catch up their children, to see here a fat man leap nimbly on to a foot path when we were a quarter of a mile away, and there an old lady refuse to budge though we were sweeping down on her with the speed of a railway train. One village woman, her cricket cap surmounting a pinched face, shut and locked her door as we came by, as if the motor-car would rush in and steal. Most interesting, naturally, were the horses. About two out of three cast a lazy glance at the rattling monster, and then, seeing that it seemed to be keeping its own side of the road, passed by with complete indifference. The younger or more mettlesome were alarmed, and often the driver was at pains to foster alarm into terror. A well-directed cut with the whip, the moment the horse perceives a strange monster bearing down on him, seldom fails of this object. And, of course, the next time the beast meets a motor-car he says, "Hallo! This is the thing I got a licking for," and begins to plunge forthwith. Other drivers jump out for their lives when the machine appears on the horizon and rush to the horse's head. "O, Lord!" says the horse; "there must be something awful in this thing to bring him out to hold me like this. I'm trying to be good, but really my heart is beating that fast——." One or two—especially ladies—are inspired to wrap the horse's head with a mackintosh, which any self-respecting beast resents; and if he happens to have a sensitive ear is maddened by a noise he can see no reason for. The good driver merely holds his horse together, and leaves it to him to make the first signal of alarm; if he puts back a questioning ear for reassurance he gets it. After that he may shy or break or bolt, but next time he will fear it less, and the next time less still. The horse must reconcile himself to the ugliness of the progress, like the rest of us.

Drowsy from the Speed.

Hen and horses, fields and trees, towns and villages marched past in swift panorama. The tale of miles mounted to over fifty, and then we turned homeward. The road was a switchback of hill and vale, and we switchbacked over it. It was strange that both going and coming there seemed far more up-hill than down. As night began to fall clouds of midges were whirled into our faces with the stinging sharpness of grit. The air rushed violently into our lungs and our skins burned. For me there was no reflection nor analysis of sensations, but rather drowsiness. I was just moving, moving through rushing air. No hearing but the hum of the engine, no sight but the ribbon of undulating road ahead; now diving down a dip, now just cresting the next rise with the momentum, never seeming to move quickly, half-animal, half-miracle, the automobile ate up mile after mile without a check, without an effort.

The climax came when, after dinner, we re-entered London. Gliding out of a house on a high hill, we were on the rim of a valley that was very deep and steep by day and bottomless pit by night. The shining sweep of the powerful acetylene lamp on the prow showed a hundred yards ahead; beyond yawned the black gulf. The driver let her go—thud—rattle—whirr—and down over the edge we swooped. Down, down, we tore—hedges skimming dimly past, cleaving the solid darkness with the sword of light. A shadow on the road ahead—a furious barking

from the horn—a man and woman leap into the light beside the road, and then are flung out behind us again. A final shoot forward—and suddenly the hedge in front is coming back to us more slowly; we are on the upward gradient, and then—plug, plug, plug—four miles an hour again. Presently ten again, a dozen —then the lights of London, the horn coughing steadily—then the suburbs—the center—home.

Then I took a hansom to my station. It had somehow never occurred to me how absurdly slow and unmanageable a contrivance is the London hansom.—G. W. Steevens in N. Y. Commercial Advertiser.

AN ENGLISH AUTOMOBILE CLUB

I have been sojourning in the land of the automobilists recently, whose conversation is of explosions, ignitions, and other dangerous-sounding topics. The enthusiasm of a new motorist is no ordinary enthusiasm. He can talk of motors —nothing but motors.

I have only had a spin on a motorcar once, and I confess that the experience was a revelation. I had imagined that it would be a joint-dislocating, unromantic ride, for I was one of those bigoted people who believe cycling to be the ideal form of locomotion for the pleasure-seeker. But I was disillusioned. Nothing could have been more exhilarating than that twenty-five miles-an-hour spin over country highways. I was converted to the motor-car at once.

The motorists have already two organizations in this country, but the favorite resort for automobilists is the Automobile Club in Whitehall Court. I paid a visit recently to the palatial premises at the disposal of its members.

The walls of the vestibule were covered with notices of various sorts referring to various phases of automobilism all over the world. Notices of motors for sale and of motors wanted, and letters testifying to the abilities of certain people as drivers hung around. One letter was from a gentleman who had his groom taught the gentle art of cleaning and driving a motor-car, and who sought a situation on the accomplished Jehu's behalf.

The club premises, which it is intended to enlarge at an early date, at present consist of a large and luxuriously furnished reception room, billiard room, card room, and dining room, and should a belated member desire to spend a night on the premises, a bedroom can always be placed at his disposal.

Ladies are admitted from 3 p. m. to 6 p. m. daily, and on special occasions, and it need hardly be stated that many of the fair sex avail themselves of this privilege after the fatigue of their morning calls. Luncheons, teas, dinners, and suppers, with full wine and spirit service, are provided daily at a very moderate figure. "House" dinners are held periodically at the club-house in the winter, and in the summer at country hotels, the journey to and fro being made on motor vehicles. It is interesting to note, too, that members who do not actually own motor-cars can secure seats for the club tours on the cars at the disposal of the club.

Concerts, to which ladies are admitted, are held from time to time, and at intervals lectures and discussions on various motor matters take place at the club-house. The club has a technical committee, which deals with scientific and legislative questions affecting automobilism. Road maps are also provided for the convenience of members, and the tables of the reception room are covered with all the more important periodicals of the day.

It will be seen, therefore, that the comfort of the automobilist is carefully studied here, and it is not surprising, therefore, that although only started in 1897, the membership already is over 400, among the members being many of the best known people who have taken to motoring. In fact, a glance at the list of members is the best testimony to the strides which the motor movement is beginning to make in this country. Up to the present, of course, we are far behind our French neighbors in motor doings, but we are improving, with the aid of the Automobile Club, which can boast the possession of all the factors that characterize a successful institution for the social advancement of science and automobilism is assuredly a science daily striding into public prominence.—The Cycle.

UNMUFFLED MOTOR TANDEMS

We think, says the Autocar pertinently, that those who promote motor cycle races on tracks or enclosures should see

that notices are circulated among the spectators, explaining that the silencers of the competing machines have been disconnected. The noise of half a dozen motor tricycles exhausting at once without the softening effects of their silencers is pretty deafening, sounding not unlike a little battery of maxims in full blast. We believe the "gate" more or less appreciate this patter while they are looking on and excited by the different events, but, of course, afterwards in cooler moments they complain of the noise. We would suggest that handbills should be sent around among the spectators merely mentioning the fact that the silencers were removed so that the power usually absorbed by them should not be wasted, and that all the motors' force might be directed towards urging on the wild career of the racing tricycles. After this a remark or two about the silence under ordinary circumstances of these temporarily noisy machines would not be amiss, and it would prevent any possibility of misunderstanding being spread further, for it should always be remembered that at every motor race there are a large number of people who have never seen a motor vehicle at close quarters before, and whose first impressions are being formed.

STANLEY'S CLIMB AGAIN DESCRIBED

F. O. Stanley is quoted in "Among the Clouds," in regard to his recent climb of Mount Washington with a Stanley steam wagon in part as follows: "We left Newton Saturday at 12 o'clock. The first day we ran to Newburyport, Mass., and remained there over night. Sunday morning we ran to Portsmouth, and remained there during the day and night. On Monday we rode to Ossipee, stopping at Rochester on the way for dinner. The distance from Portsmouth to Rochester was fifty-four miles. The next day's run was from Ossipee to North Conway, stopping at Silver Lake for dinner. We remained at the Kearsarge House at North Conway over night. On Wednesday morning we ran to Darby Field Cottage, remaining there during the afternoon and night. We learned there that it would be necessary to make the ascent of the mountain in the morning to avoid meeting teams which go down in the afternoon. The cyclometer at the base of the mountain (the site of the old Glen House) registered 197 miles, which is the distance from Newton to the base of Mt. Washington. We had averaged to that point 14 4-10 miles per hour during the run from Newton. We found the ascent up the mountain more difficult than we anticipated, although we had no trouble in climbing the steepest grades. The actual running time from base to summit was over two hours and ten minutes. As the carriage is constructed for road use, we found it necessary in climbing the mountain, where the average grade for eight miles was a little over 10 per cent, to jack up the rear wheels and run the engine for a few minutes in order to supply sufficient water to the boiler. In other respects the journey up the mountain was as free from any incident as the same distance traveled on a level. The fact that during the entire trip from Newton to Summit, a distance of 205 miles, not the slightest difficulty in the way of breakage or loose nuts or anything to mar the pleasure of the journey happened is quite remarkable. We can both say without reserve that if the roads from Rochester to North Conway were as good as the rest of the journey this would soon be the popular way of visiting the mountains.

"The amount of gasolene required to ascend the mountain was less than two gallons. Thus it will be seen that for a gentleman and his wife to ride up Mt. Washington by such a vehicle will cost less than 25 cents for power. It required the water tank twice full to make the ascent. As the Half-Way House is well supplied with water, it forms a good place for refilling the tank."

CLIMB TO LICK OBSERVATORY

San Jose, Cal., Sept. 14.—President David Starr Jordan of Stanford University went up above the clouds yesterday in an automobile. He traveled to Mount Hamilton, calling upon Director James E. Keeler, of the Lick Observatory. The altitude, 4,200 feet.—Chicago Tribune.

SIMPLE SWISS TRAFFIC RULES

Cantons Geneva and Pays de Vaud of the Swiss republic have ratified regulations for motor vehicle traffic. The two cantons agreed readily upon the same rules. They are very brief and simple and appear satisfactory to all concerned.

Motor vehicle races are much in demand by managers of county fairs.

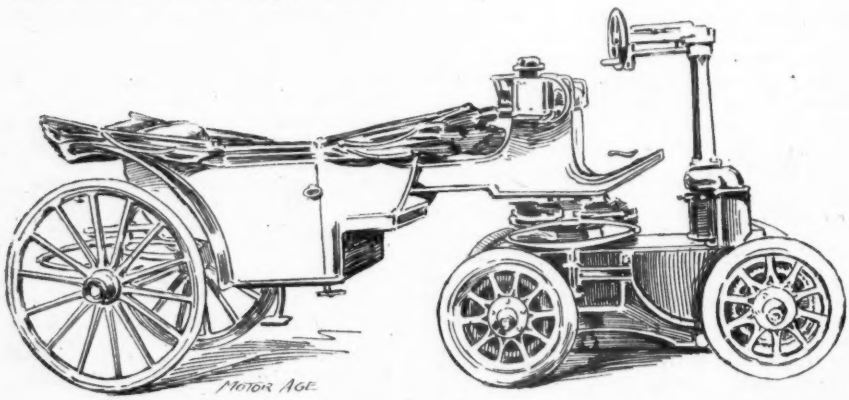
WHERE THEORY OF PROMISE PREVAILS

POSSIBILITIES OF MOTOR HORSE

THE HEILMAN FOUR-WHEELED ELECTRIC TRACTOR AND ITS SIGNIFICANCE FOR THE TIRE PROBLEM.—THE ECONOMY IN DETACHABLE TRACTORS GENERALLY.

The idea of separating the motor from the carriage has not so far found much favor in this country but has numerous advocates in Europe. The drawbacks to the system lie principally in a matter of looks and in certain difficulties in the way of managing the motor and its appended carriage with the same precision that is possible when the whole carriage is weighted down with the motor mechanism. It is considered awkward that the driver's position is distinctly different from that of the carriage occupants so that the owner of the carriage, when he desires to drive it, may be mistaken for a hired attendant. This objection may be largely overcome by suitable design in private carriages, and in those for public hire turns into an advantage.

The mechanical horse is made with gasolene motors as well as with electric power in France and usually with only two wheels, but it is perhaps specially the four-wheeled electric tractor which is entitled to attention on account of the assistance which it offers to solve the vexatious tire problem in the case of heavy carriages. It distributes the weight on six wheels instead of four, reduces the total weight largely by reducing the dimensions of the structure which supports the batteries, and renders small driving-wheels available without sacrificing the appearance of the carriage portion.



The Heilman Electric Horse and Carriage.

Six Wheels to Carry Weight.

The illustration shows the pattern evolved by Mr. Heilman, a noted electrical engineer in Paris. This "horse," which is provided with four wheels, serves to remove the great load of batteries and motor from the carriage and its wheels so that they may be constructed as light and graceful as those of horse drawn carriages. In fact the ordinary carriage may be readily adapted for use by removal of front wheels and axle, and the economy thereby effected is counted upon to introduce mechanical traction in many places where it is desirable to use motor power and horse power interchangeably, with the same carriages.

STEAM WAGON MAKER TALKS

The Strathmore Automobile Company of Boston is officered by A. H. Patterson president, J. D. W. Clark treasurer and A. M. Cummings general manager. It proposes to manufacture steam carriages and has one on the road now.

A. M. Cummings of this company has a way of putting things plainly to newspaper reporters which should be of benefit to the public. In the Manchester, Mass., Union he is quoted on the subjects of speed, cost and motive power as follows:

Speed and safety on automobiles are solely questions of the road. No question is asked us oftener than, How fast can you

travel? The answer to this is that the only limit is how far you are willing to risk your machine and neck. The carriage will cover the ground all right. On a fine boulevard we can easily make thirty miles an hour, but on a poor road this would be at the expense of such a jolting as destroys all pleasure in riding and is sure to end in the speedy destruction of the machine.

As to the cost of the horseless vehicles, some uncertainty exists. Of course, as the years go by, they will cheapen; but probably far less than some persons anticipate. A first-class sewing machine costs today full as much as it did twenty years ago, if we take the value of money into consideration. The automobile will always be costly, if style and looks are considered; just as the prices of high-grade carriages keep up year after year. If a man wants a handsome and stylish carriage, he will have to pay for it. If he is willing to ride around on an animated coal-hod, he can do it less expensively.

"As to the use of liquid air as a motive power," Mr. Cummings spoke tersely and strongly. "It is a humbug and delusion, and no more practical for a motive power as at present known than moonbeams. What it may develop into, of course, no man can say; but there is no special reason to look to it for any practical results. True, if confined it exerts great power; but so do a hundred other things known to the chemist. Mere power is of very little consequence. A pound of dynamite will give you all the power you want. The thing is to apply and control the power. This cannot be done with liquid air. No piston, wheel or valve could work at such a temperature; and the exhaust would be filled with solid ice in an instant."

MOTORS FOR LIFE-SAVING BOATS

Officials of the life-saving stations at Marquette, Mich., have been experimenting with a motor in a 34-foot life-boat, the largest size regularly used in the service. A speed of seven miles per hour was obtained and the weight of the motor did not affect the self-righting properties of the boat. The engine is described as a triple-expansion naphtha engine of 12-H. P., in which gasolene is used like water in a steam engine, while the vaporizing of the gasolene is accomplished by electrical heating. This is probably a mistake, as an internal-explosion gasolene motor could be more readily adapted for the purpose.

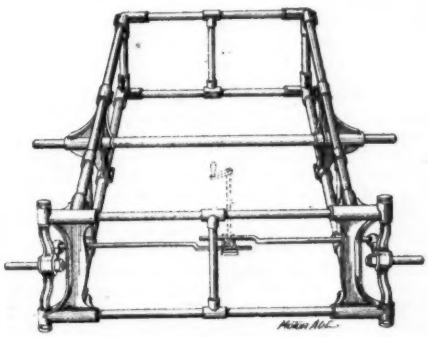
MAJOR DAVIDSON'S VENTURE

Major R. P. Davidson of the Highland Park Military Academy, who intends to drive a motor vehicle with a rapid-firing gun mounted on its front portion from Peoria, Ill., to Washington, D. C., with four men up, is being heralded as "the inventor of the first automobile gun carriage." As a matter of fact the vehicle which he proposes to use is a Charles E. Duryea dos-a-dos of the usual type made in Peoria, to which an ordinary rapid-firing gun is attached without any remodeling of the carriage worth mentioning. A gun so mounted on the Simms "Motowheel" was exhibited at the recent Richmond show in England and was called the Simms Scot. The only difference is that Major Davidson proposes to carry four men on the Peoria vehicle in addition to the gun, while the Simms Scout has only one man. If Major Davidson succeeds in completing his projected trip it will, however, be a notable performance in favor of Charles E. Duryea's construction. The public may await the result with interest. So far no results are chronicled.

THE HEYMANN VEHICLE FRAME

From the patent on a carriage frame obtained by the Heymann company August 1 last a drawing of the framework of the Heymann phaeton shown on the first page of this issue a drawing of the framework of this vehicle is shown reproduced herewith.

The officers of the company are Dr. Ralph M. Fogg president, Charles H. Pratt treasurer, Edward Heymann vice-president. The latter and T. W. Heymann are the constructors.



Frame of Heymann Phaeton.

TO MANUFACTURE IN OMAHA

The Omaha Gas Engine and Motor Company is the style of a firm which has purchased a large building in Omaha where machinery will be installed for the manufacture of gasolene motor wagons constructed according to plans of Naval Constructor Clover, stationed at Tampa, Fla. R. P. Sharples and S. W. McKee of Omaha are mentioned as members of the firm.

The Avery & Jenness Company, manufacturers of bicycle specialties at 28 W. Washington street, Chicago, are building an experimental gasolene motor vehicle.

THE CAPITAINE KEROSENE MOTOR

This is one of the few engines on the market at present using ordinary kerosene oil. It is a vertical engine of a very compact design, 800 lbs., and requiring a floor space 2 feet by 3 feet, with a height of 4 feet. Among its most novel features may be mentioned the connection of piston to crank; the fuel pump, the governor, and the lubricating device.

The piston is connected to the crank through a rocker-arm or inverted walking-beam in the base of the engine. This arrangement reduces the wear on the piston and cylinder walls and also reduces vibration by substituting a force practically parallel to the cylinder axis during the whole stroke for the angular force where the piston is connected direct to the crank.

The fuel (ordinary kerosene, specific gravity about 0.80) is forced into the cylinder by a diaphragm pump which operates without valves. The flexible diaphragm of this pump is worked by a cam on a secondary shaft, which in turn receives its motion through an eccentric on the main shaft, and a push and pull ratchet. It makes one revolution to four revolutions of the main shaft.

The governor is based on the varying degree of compression in a cylinder with fixed outlet, and in which a piston works due to the changes in speed of the engine and consequent change in speed of the governor piston, which is worked from the secondary shaft mentioned above. When the speed of the engine exceeds a certain limit, thus raising the pressure in the governor cylinder above that for which its outlet valve is set, this outlet valve is closed and the pressure in the cylinder is greatly increased by the continued advance of its piston. This increased pressure is used to disengage the push and pull ratchet which communicates the motion to the cam of the fuel pump, thus stopping the supply of fuel until the engine speed has fallen to the normal.

Lubrication is made positive by the use of a small force pump operated from secondary shaft, which forces oil to every bearing and to cylinder every second revolution of the engine. There is a glass reservoir in plain view from which the lubricating oil is pumped.

Admission and exhaust valves are of the ordinary poppet type, but instead of being actuated by cams and levers, as is customary, are in this engine worked by the vacuum in the cylinder. Hot tube ignition is used.

All the working parts are enclosed in a neat casing. There are two fly wheels, and these are of such size compared with the body of the engine as to give it the appearance of unusual compactness.

A test of this engine made by Professor Denton, of Stevens Institute of Technology, shows the fuel consumption at full load to be about one pound per brake horse power per hour.

This engine seems to be very well adapted to use on small boats and automobiles. It is very compact and the weight will probably be further reduced as a result of improvements which will be made as experience shows them desirable. It is almost free from vibration and the exhaust gases are so nearly odorless that they would be scarcely noticeable in the trail of an automobile. It requires only a small weight of cooling jacket water on account of the low ignition temperature of the fuel used, and its form is such as to be readily applicable to automobiles.

The engine is manufactured in this country by the Manhattan Oil Motor Company, of Jersey City, N. J.

KING'S MOTORS AND DRIVES

A. W. King, builder of motor vehicle engines at 71 West Jackson street, Chicago, supplies the following information in regard to his motor trade. At present he confines himself to manufacture of gasoline motors exclusively for builders of motor vehicles and launches.

His motors and driving gears are scheduled as follows:

4 H. P.—Weight 250 lbs.—$275.
6 H. P.—Weight 380 lbs.—$360.
8 H. P.—Weight 425 lbs.—$475.
12 H. P.—Weight 600 lbs.—$600.

The corresponding transmission mechanisms are priced at $150, $180, $220 and $300.

With each engine he furnishes two vaporizers, two automatic injectors, two automatic gasometers, two mufflers, one water circulating pump, one dynamo, and one Ruhmkorff coil (platinum painted electrodes, jump spark, outside contact-breakers). Each engine could be used independently should occasion arise. The engines are two opposed cylinders, balanced, incased crank type. They are calculated to be placed in vehicles transversely, parallel with axles. Engines can be placed in front or rear of vehicles. Drives are constructed so as to effect the starting, braking, stopping and reversing of vehicles by means of one lever only, located to the right hand of the operator. The only other lever, which is located on the right and outside of seat, is the speed chain lever. Two levers operate entire vehicle. Engines are guaranteed to develop more than power they are listed at. For example 6 H. P. engine develops as high as 7½ B. H. P. at 500 revolutions. When engines and drives both are ordered, they are supplied rigidly attached to one angle-steel frame so as to make a compact and coherent piece of machinery ready to be placed upon the running gear. Lugs for rear springs are on steel frame. Front end of frame fitted to receive universal joint for independent motion of front wheel. Mufflers, pump and all mechanism, including tanks and condenser, are attached to steel angle frame. Differential gear is within countershaft of drive, which latter is of the friction class built on a special patented plan, giving speed from walking gait to 20 miles per hour.

The construction as described is intended for vehicles in which the rear axle is rigid, and each of the driving wheels is driven by a separate chain.